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(71) Applicant(s)

STX Inc

(Incorporated in USA - Maryland)

1500 Bush Street, Baltimore, Maryland 21230,
United States of America

(72) Inventor(s)

Richard B C Tucker

William C Crawford

Fielding H Lewis

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Jackie L Davis

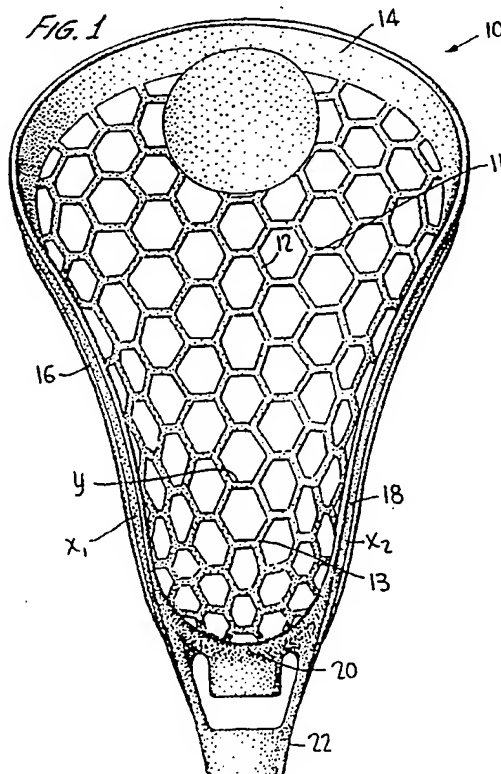
(74) Agent and/or Address for Service

Gallafent & Co

8 Staple Inn, LONDON, WC1V 7QH, United Kingdom

(54) Lacrosse stick head.

(57) A unitary head (10) for a lacrosse stick comprises a frame (14, 16, 18, 20) and webbing (12) wherein the webbing (12) is integrally moulded to the head frame and has a first ball receiving continuous curvature and a second continuous curvature in the pocket area of the webbing. The second curvature has an angle of curvature greater than the first curvature. The side walls (16, 18) of the frame are separated by at least 50 mm in the area of the pocket and the pocket has a maximum depth of 92 mm. The lacrosse stick has improved playing characteristics.



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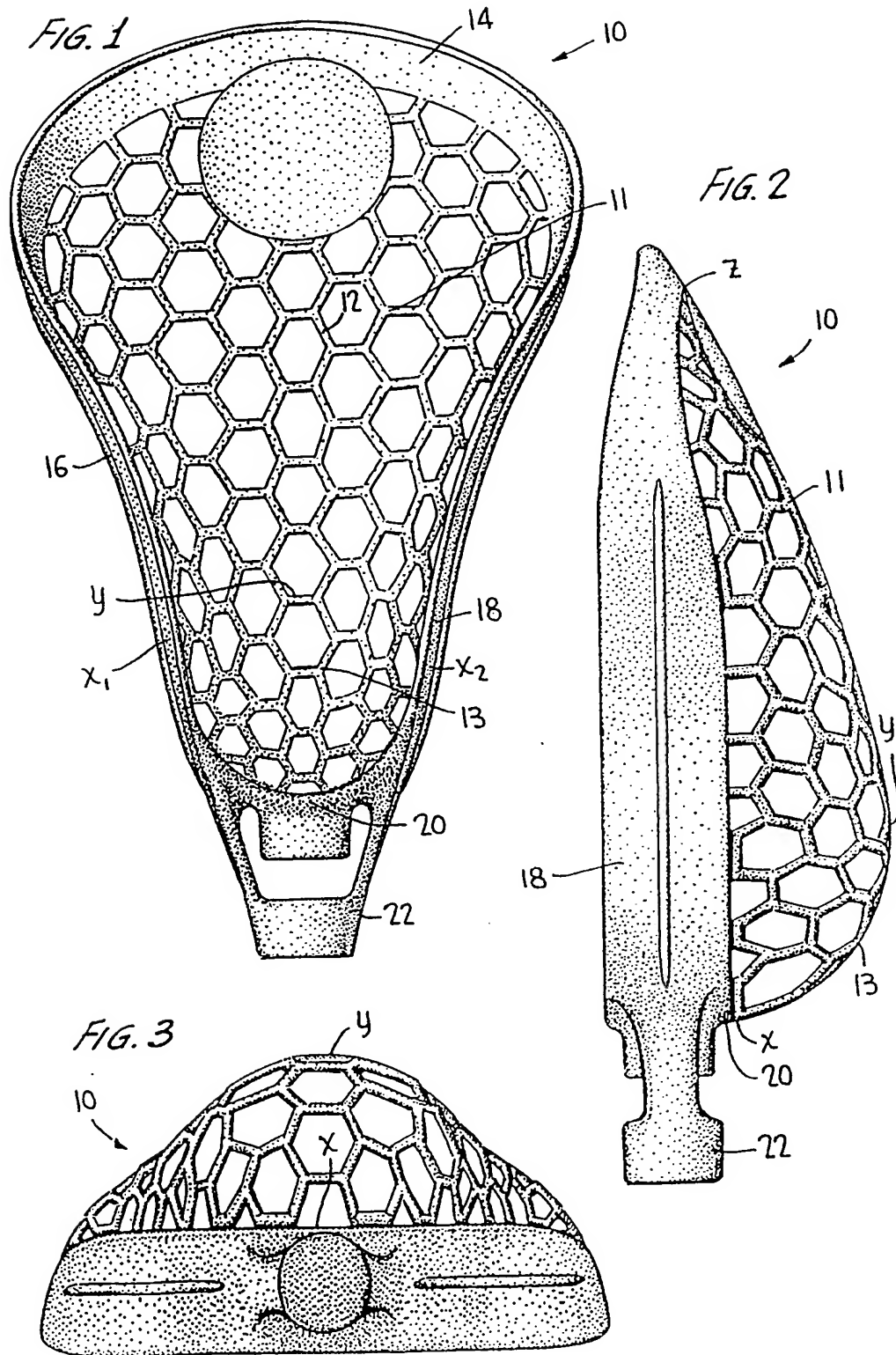


FIG. 4

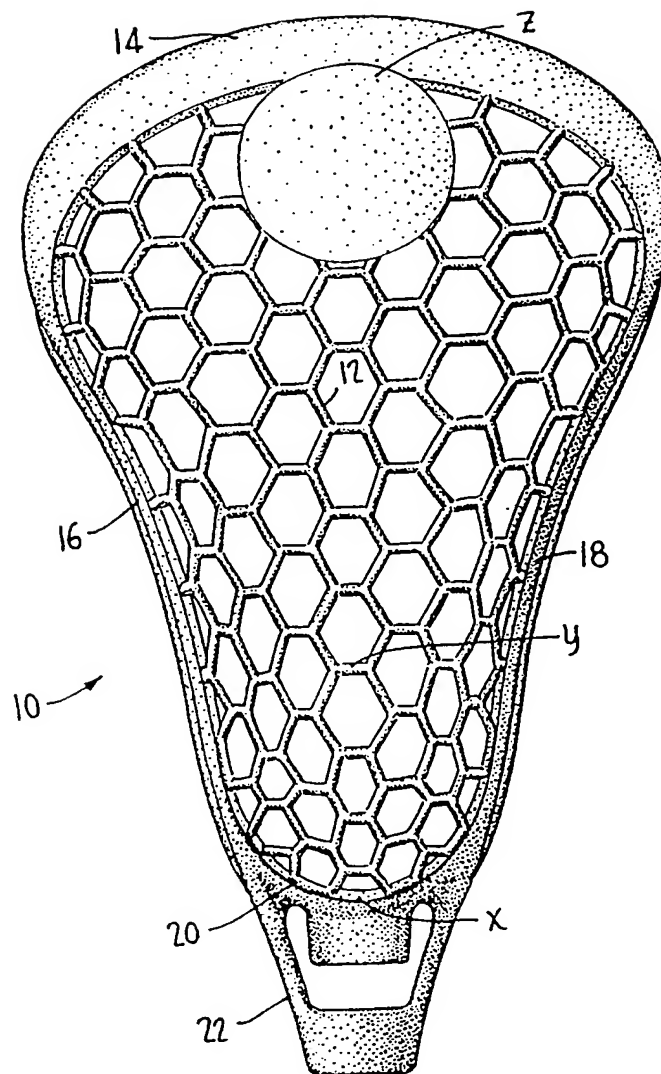
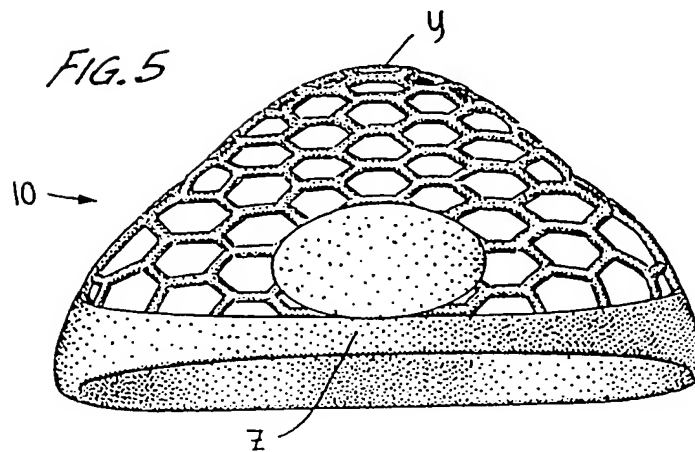


FIG. 5



- 1 -

LACROSSE STICK HEAD

This invention relates to lacrosse sticks and, more particularly, a lacrosse stick head having a unitary plastic construction in which the pocket area of the head which receives and retains a lacrosse ball has critical dimensions with respect to width between the side walls across the pocket area and the depth of the pocket. The integral webbing of the head also has a first continuous curvature from the point of maximum depth of the pocket to the scoop area of the webbing and a second continuous curvature from the point of maximum depth of the pocket to the throat area of the head. The novel stick has improved playing characteristics.

In the early prior art, lacrosse sticks were customarily made of wood, usually hickory, shaped by American Indians with whom the game originated. Such lacrosse sticks lacked uniformity as to quality, strength, weight and feel in the hands of a player.

To overcome the disadvantages of the prior art, Tucker et al in US Patent No 3,507,495 disclosed a lacrosse stick having an elastomeric frame. Since that time, great

strides have been made in the construction of lacrosse stick heads and handles. For example, US Patent Nos 3,822,062 and 3,905,088 to Tucker et al and US Patent No 4,034,984 to Crawford et al disclose elastomeric lacrosse stick heads and parts therefor which have further dramatically revolutionised the sport of lacrosse. Additionally, US Patent Nos 4,739,994, 4,037,841 and 4,206,918 to Lewis disclose novel lacrosse stick handles which have still further enhanced the quality of lacrosse sticks.

Moreover, Tucker et al in Canadian Patent No 1,109,091, issued 15th September 1981, describe a lacrosse stick having a head of integral plastic construction. This lacrosse stick has been sold by STX, Inc., Baltimore, Maryland, the assignee of the Canadian patent, under the trade name "STXBALL". Although the stick has received substantial recognition, it has been accepted primarily as a lacrosse stick for use in physical education play or casual type play.

The present invention seeks to provide a new lacrosse stick with a head having a unitary plastic frame and pocket for use as a beginner stick, or as a stick for recreation by accomplished players. The lacrosse stick head has critical dimensions and shape which facilitate receiving a ball into the pocket of the lacrosse stick head and retaining the ball.

According to the present invention, the lacrosse stick head is made of a moulded plastic material such as low density polyethylene, high density polyethylene, nylon or the like. The unitary head comprises a frame made up of a stop or throat area, side walls extending from the stop

or throat area to a scoop, and a webbing including a pocket area. The open face of the lacrosse stick frame is dimensioned in order that the width between the side walls of the frame directly inwardly spaced from the
5 deepest point of the moulded pocket area of the webbing is at least 50 mm, with the depth from the deepest point of the pocket to the open surface of the lacrosse stick frame being no more than about 91 mm. The overall length of the head from the stop area of the head to the
10 extremity of the scoop area is from about 200 to 255 mm. As another important feature, the plastic webbing has a first continuous curvature from the point of maximum depth of the pocket to the scoop. This curvature is designed to guide the ball into the pocket. There is a
15 second continuous curvature from the point of maximum depth of the pocket down to the throat area. The slope of the second curvature is greater than the slope of the first curvature and forms the pocket for receiving and retaining the ball.

20 These critical dimensions of the head and curvatures of the webbing provide a lacrosse stick which has excellent play characteristics when using a ball having a diameter ranging from about 50 mm up to about 76 mm. The first
25 curvature of the webbing is designed in order to facilitate receiving a projected ball and the guiding of that ball into the pocket area. It has been found that the angle of this first curvature is more critical the harder or more rigid the polymer used in forming the
30 webbing. Thus, a webbing of softer characteristics will receive the ball and absorb the impact energy, at least to a limited extent. A harder polymer material will not absorb the impact energy as readily, causing the ball to rebound to a greater extent, requiring greater control by

the angle of curvature. The second curvature, or the curvature of the pocket, holds the ball once in the pocket.

5 The invention is illustrated, by way of example, with reference to a preferred embodiment which is shown in the accompanying drawings, in which:

10 Figure 1 is a front view relative to the ball receiving surface of an integral lacrosse stick head according to the present invention;

15 Figure 2 is a side view of the lacrosse stick head of Figure 1;

Figure 3 is an end view from the throat end of the lacrosse stick head;

20 Figure 4 is a view from the pocket side of the lacrosse stick head; and

Figure 5 is an end view from the scoop end of the lacrosse stick head.

25 The lacrosse stick head of the present invention generally designated 10 includes a frame comprising scoop 14 and side walls 16 and 18, stop area 20 and handle area 22. The frame is designed and constructed similarly to the frame of the head disclosed in Tucker et al, US
30 Patent No 3,507,495, and has a generally V-shaped configuration. As illustrated, the lower end of the head is formed as a throat 20 from which the two side walls 16 and 18 are inclined and diverge upwardly and outwardly and closed by scoop or transverse wall 14. The handle

area 22 is designed to receive the handle, not shown, of the lacrosse stick. A webbing 12 is integral with the frame and includes a ball guiding area 11 and a pocket area 13.

5

As best shown in Figures 2 and 2 of the drawing, the deepest point of the pocket 13 is at y. The critical dimension between side walls 16 and 18 is at points x1 and x2 which extend substantially across from the maximum
10 depth y of the pocket. The width between x1 and x2 must be at least 50 mm, preferably from 50 to 89 mm, and most optimally is approximately 68 mm. The maximum depth from point y of the pocket to the surface of a line joining x1 and x2 is at most a distance of 92 mm, preferably is from
15 66 to 92 mm, and optimally is 76 mm. The overall length of the stick from the scoop end 14 to the end of the handle area 22 is from 203 to 277 mm.

As best shown in Figure 2, there is a first curvature of the webbing 12 extending from point z at the centre of the scoop end to point y. There is a second curvature from point y to the centre of the stop area x. The continuous curvature between z and y is more shallow than the curvature from y to x. The preferred radius of
20 curvature between y and z is 305 mm and the preferred radius of curvature between y and x is 51 mm. The radius of curvature between y and z can vary from 254 mm to 1016 mm and the radius of curvature between y and x can vary from 19 mm to 57 mm, it being required, however, that the
25 curvature between y and x is the sharper curvature. These curvatures provide for improved play.
30

A Keeper Strap, not shown in Figure 1, can extend from wall 16 to wall 18 substantially in the area directly

inward from point y. Keeper Strap is a trade mark of STX, Inc., Baltimore, Maryland. The Keeper Strap may or may not be used during play and retains the ball in position during play, particularly when beginners are learning the game of lacrosse. Such a flexible member, positioned across the face of the lacrosse stick head, and constructed and arranged partly to enclose the pocket, can, if desired, be moulded integrally with the head.

As is apparent, the lacrosse stick head of the present invention is not suited to form a regulation lacrosse stick, but rather is designed primarily for beginners learning the game of lacrosse, or for casual play by accomplished lacrosse players.

The unitary head is formed by moulding a polymer material characterised by toughness, high impact resistance and good flexibility, as well as other desirable properties explained in the aforesaid US Patent No 3,507,495.

Presently preferred materials are low density polyethylene, high density polyethylene and a nylon resin marketed under the DuPont trade mark ZTEL ST 801. This polymer has outstanding impact resistance and good mouldability, permitting injection moulding.

Unreinforced ZTEL ST 801, with a water content of 0.2% at 22.2°C using the ASTM test method D638 has a tensile strength of 548 kg/cm² a yield strength of 548 kg/cm², and an elongation at break of 40%. It has a specific gravity of 1.09 using the ASTM test method D792, and a Rockwell hardness of R112 using ASTM test method D785.

Another preferred material is an injection mouldable polymer material sold under the DuPont trade mark HYTREL. Still another material suitable for making head 10 is the

reaction product of Adiprene L315 and 4,4'-methylen-bis-
(2-chloroaniline) using the formulation and manufacturing
procedure as set forth in the aforesaid US Patent No
3,507,495, the disclosure of the '495 patent being
5 incorporated herein by reference.

The design of the webbing shown in the drawing is a
preferred design from the standpoint of appearance. The
openings in the plastic forming the webbing are rounded
10 at all surfaces to avoid sharp edges for safety purposes.
Other designs of the webbing and of the frame of the
head, including a straight walled frame, can be used.

CLAIMS

1. A unitary head for a lacrosse stick comprising a generally V-shaped plastic moulded open faced frame comprising two side walls joined at a juncture and diverging therefrom and a transverse wall joining the ends of the side walls opposite the juncture, and a plastic webbing integrally moulded with the side walls and transverse wall of the frame to join the side walls and transverse wall, the webbing having a ball receiving area and a ball pocket area, the webbing further having a first continuous curvature extending from the transverse wall to a point in the pocket area where the pocket has its greatest depth, and a second continuous curvature from the point of greatest depth in the pocket to the juncture, the second curvature having an angle of curvature greater than the angle of curvature of the first curvature, the side walls at the point immediately adjacent the pocket area of greatest depth being separated by a width of at least 50 mm and the maximum depth of the pocket area to the surface of the open-faced frame being 92 mm.
2. A unitary lacrosse stick head according to Claim 1 wherein the overall length of the head from the juncture to the transverse wall is from 200 to 255 mm.
3. A unitary lacrosse stick head according to Claim 2 wherein the width separating the side walls is from 50 to 76 mm and the maximum depth of the pocket is 76 mm.
4. A unitary lacrosse stick head according to any one of Claims 1 to 3 wherein the webbing is formed of a plurality of hexagons wherein the hexagons have rounded

edges.

5. A unitary lacrosse stick head according to any one of Claims 1 to 4 wherein the juncture is constructed and
5 arranged to removably receive a handle.

6. A unitary lacrosse stick head according to any one of Claims 1 to 5 wherein the plastic is low density
10 polyethylene.

7. A unitary lacrosse stick head according to any one of Claims 1 to 5 wherein the plastic is high density
polyethylene.

8. A unitary lacrosse stick head according to any one of Claims 1 to 5 wherein the plastic is nylon.
15

9. A unitary lacrosse stick head according to any one of Claims 1 to 8 including a flexible member positioned
20 across the face of the lacrosse stick constructed and arranged to partially enclose the pocket.

10. A unitary lacrosse stick head according to Claim 9 wherein the flexible member is integrally moulded with
25 the unitary head.

11. A unitary lacrosse stick head substantially as hereinbefore described and illustrated in the
accompanying drawings.
30

12. A lacrosse stick having a unitary lacrosse stick head according to any one of the preceding Claims.

Amendments to the claims have been filed as follows

1. A unitary head for a lacrosse stick comprising a generally V-shaped plastic moulded open faced frame
5 comprising two side walls joined at a juncture and diverging therefrom and a transverse wall joining the ends of the side walls opposite the juncture, and a plastic webbing integrally moulded with the side walls and transverse wall of the frame to join the side walls
10 and transverse wall, characterised in that the webbing having a ball receiving area and a ball pocket area, the webbing further having a first continuous curvature extending from the transverse wall to a point in the pocket area where the pocket has its greatest depth, and
15 a second continuous curvature from the point of greatest depth in the pocket to the juncture, the second curvature having an angle of curvature greater than the angle of curvature of the first curvature, the side walls at the point immediately adjacent the pocket area of greatest
20 depth being separated by a width of at least 50 mm and the maximum depth of the pocket area to the surface of the open-faced frame being 92 mm.

2. A unitary lacrosse stick head according to Claim 1
25 wherein the overall length of the head from the juncture to the transverse wall is from 200 to 255 mm.

3. A unitary lacrosse stick head according to Claim 2
wherein the width separating the side walls is from 50 to
30 76 mm and the maximum depth of the pocket is 76 mm.

4. A unitary lacrosse stick head according to any one of Claims 1 to 3 wherein the webbing is formed of a plurality of hexagons wherein the hexagons have rounded

edges.

5. A unitary lacrosse stick head according to any one of Claims 1 to 4 wherein the juncture is constructed and arranged to removably receive a handle.

6. A unitary lacrosse stick head according to any one of Claims 1 to 5 wherein the plastic is low density polyethylene.

7. A unitary lacrosse stick head according to any one of Claims 1 to 5 wherein the plastic is high density polyethylene.

8. A unitary lacrosse stick head according to any one of Claims 1 to 5 wherein the plastic is nylon.

9. A unitary lacrosse stick head according to any one of Claims 1 to 8 including a flexible member positioned across the face of the lacrosse stick constructed and arranged to partially enclose the pocket.

10. A unitary lacrosse stick head according to Claim 9 wherein the flexible member is integrally moulded with the unitary head.

11. A unitary lacrosse stick head substantially as hereinbefore described and illustrated in the accompanying drawings.

12. A lacrosse stick having a unitary lacrosse stick head according to any one of the preceding Claims.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

12.

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Relevant Technical Fields

(i) UK Cl (Ed.M) A6D (D11G D12B)

(ii) Int Cl (Ed.5) A63B (59/02)

Search Examiner
D W WHITFIELD

Date of completion of Search
1 FEBRUARY 1994

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES: WPI

Documents considered relevant following a search in respect of Claims :-
1-12

Categories of documents

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|---|---|
| X: Document indicating lack of novelty or of inventive step. | P: Document published on or after the declared priority date but before the filing date of the present application. |
| Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. | E: Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| A: Document indicating technological background and/or state of the art. | &: Member of the same patent family; corresponding document. |

Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1589596 (BURNETT) whole document	1-3, 5-10

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Lacrosse stick head

Patent Number: ☐ US5269532
Publication date: 1993-12-14
Inventor(s): TUCKER ROBERT B C (US); CRAWFORD WILLIAM C (US); LEWIS JR FIELDING H (US); DAVIS JACKIE L (US)
Applicant(s): STX INC (US)
Requested Patent: ☐ JP7039612
Application Number: US19930001767 19930107
Priority Number(s): US19930001767 19930107
IPC Classification: A63B59/02
EC Classification: A63B59/02
Equivalents: AU5302594, AU673205, CA2112721, ☐ GB2274067

Abstract

A unitary head for a lacrosse stick comprising a frame and webbing, wherein the webbing integrally molded to the head frame has a first ball receiving continuous curvature and a second continuous curvature in the pocket area of the webbing wherein the second curvature has an angle of curvature greater than the first curvature and wherein the side walls of the frame are separated by at least 2 inches in the area of the pocket and the pocket has a maximum depth of 35/8 inches. The lacrosse stick has improved playing characteristics.

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